

Claims

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1. A method of fabricating a discrete coil, comprising the steps of:
- a) providing a conductor wound in a coil on a tube, said coil having a coil outer surface, said coil outer surface comprising insulation; and
 - b) opening a window in said insulation on said coil outer surface to expose conductor of said coil for a contact; and
 - c) providing a movable core within said tube for adjusting inductance of said coil.
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2. The method as recited in claim 1, wherein said providing a conductor step (a) comprises the step of providing a tube and a wire, said wire comprising conductor and insulation, and winding said wire around said tube.
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3. The method as recited in claim 1, wherein said wire comprises two ends, wherein neither of said ends is extended from said coil for contacting.
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4. The method as recited in claim 1, further comprising the steps of:
- d) providing a substrate; and
 - e) surface mounting said coil to said substrate.
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5. The method as recited in claim 4, wherein said substrate comprises a printed circuit board, a ceramic substrate, a flex, or an integrated circuit.

- 1 6. The method as recited in claim 4, wherein said surface mounting step (e) comprises
2 the step of electrically connecting conductor exposed in said window in said
3 insulation to said substrate.
- 1 7. The method as recited in claim 6, further comprising the step of providing a solder or
2 conductive polymer, wherein said electrical connecting step comprises joining with
3 said solder or said conductive polymer.
- 1 8. The method as recited in claim 7, wherein said joining step comprises providing
2 solder paste between said substrate and said conductor exposed in said window and
3 heating to reflow said solder.
- 1 9. The method as recited in claim 4, further comprising the step of providing additional
2 electronics on said substrate.
- 1 10. The method as recited in claim 9, further comprising the step of connecting said
2 additional electronics to said coil.
- 1 11. The method as recited in claim 10, further comprising providing a housing for holding
2 said coil, said substrate, and said additional electronics.
- 1 12. The method as recited in claim 11, further comprising the step of hermetically sealing
2 said housing.
- 1 13. The method as recited in claim 11, further comprising the step of providing pins for
2 external connection through said housing.
- 1 14. The method as recited in claim 11, wherein said coil and additional electronics
2 comprise a sensor.

- 1 15. The method as recited in claim 14, wherein said sensor comprises a variable
2 reluctance transducer.
- 1 16. The method as recited in claim 14, wherein said sensor is for measuring strain,
2 displacement, acceleration, force, or pressure.
- 1 17. The method as recited in claim 14, further comprising the step of providing a circuit
2 to correct for temperature variation.
- 1 18. The method as recited in claim 17, wherein said circuit is integrated within said
2 package.
- 1 19. The method as recited in claim 17, wherein said circuit is located within signal
2 conditioning electronics separate from said package.
- 1 20. The method as recited in claim 9, wherein said additional electronics provides
2 excitation or synchronous demodulation.
- 1 21. The method as recited in claim 9, wherein said additional electronics converts an ac
2 waveform from said bridge to a dc voltage.
- 1 22. The method as recited in claim 1, further comprising the step of packaging said coil in
2 a hermetic package.
- 1 X 23. The method as recited in claim 1, wherein said step of opening a plurality of windows
2 comprises abrading said insulation, chemically etching said insulation, or laser
3 ablating said insulation.

1 X 24. The method as recited in claim 23, wherein in said step of laser ablating said
2 insulation, an excimer laser is used.

1 f 25. The method as recited in claim 23, wherein in said step of laser ablating said
2 insulation, each said window in said wire insulation extends over a plurality of wires
3 of said winding.

1 f 26. The method as recited in claim 23, wherein said step of laser ablating said insulation
2 comprises ablating a ring shaped window in said wire insulation.

1 27. The method as recited in claim 1, wherein said insulation comprises polyimide.

1 28. The method as recited in claim 1, further comprising the step of providing a structure
2 for holding position of core within tube.

1 29. The method as recited in claim 28, further comprising the step of providing a
2 structure for resetting position of core within tube.

1 30. The method as recited in claim 29, wherein said structure for resetting position of
2 core within tube comprises an electronically controllable clamp.

1 31. The method as recited in claim 30, wherein said electronically controllable clamp
2 comprises a shape memory alloy.

1 32. The method as recited in claim 29, wherein said structure for resetting position of
2 core further comprises a spring so said core can snap to a new position when said
3 clamp is released.

1 33. The method as recited in claim 1, further comprising the step of dicing through said
2 coil and through said tube to provide a plurality of short coils, each said coil having at
3 least one window in said insulation.

1 34. A method of fabricating a discrete coil, comprising the steps of:

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- 3 a) providing a conductor wound in a coil, said coil having a coil outer surface,
4 said coil outer surface comprising insulation; and
- 5 b) opening a plurality of windows in said insulation on said coil outer surface to
6 expose conductor of said coil for contacts; and
- 7 c) dicing through said coil to provide a plurality of short coils, each said short
8 coil having at least one said window in said insulation.

1 35. The method as recited in claim 34, wherein said providing a conductor step (a)
2 comprises the step of providing a tube and a wire, said wire comprising conductor and
3 insulation, and winding said wire around said tube.

1 36. The method as recited in claim 34, wherein said wire comprises two ends, wherein
2 neither of said ends is extended from said coil for contacting.

1 37. The method as recited in claim 34, further comprising the steps of:

- 2 d) providing a substrate; and
- 3 e) surface mounting said coil to said substrate.

1 38. The method as recited in claim 37, wherein said substrate comprises a printed circuit
2 board, a ceramic substrate, a flex, or an integrated circuit.

1 39. The method as recited in claim 37, wherein said surface mounting step (e) comprises
2 the step of electrically connecting conductor exposed in said window in said
3 insulation to said substrate.

1 40. The method as recited in claim 39, further comprising the step of providing a solder
2 or conductive polymer, wherein said electrical connecting step comprises joining with
3 said solder or said conductive polymer.

1 41. The method as recited in claim 40, wherein said joining step comprises providing
2 solder paste between said substrate and said conductor exposed in said window and
3 heating to reflow said solder.

1 42. The method as recited in claim 37, further comprising the step of providing additional
2 electronics on said substrate.

1 43. The method as recited in claim 42, further comprising the step of connecting said
2 additional electronics to said coil.

1 44. The method as recited in claim 43, further comprising providing a housing for holding
2 said coil, said substrate, and said additional electronics.

1 45. The method as recited in claim 44, further comprising the step of hermetically sealing
2 said housing.

1 46. The method as recited in claim 44, further comprising the step of providing pins for
2 external connection through said housing.

1 47. The method as recited in claim 44, wherein said coil and additional electronics
2 comprise a sensor.

- 1 48. The method as recited in claim 47, wherein said sensor comprises a variable
2 reluctance transducer.
- 1 49. The method as recited in claim 47, wherein said sensor is for measuring strain, or
2 displacement,
- 1 50. The method as recited in claim 47, further comprising the step of providing a circuit
2 to correct for temperature variation.
- 1 51. The method as recited in claim 50, wherein said circuit is integrated within said
2 package.
- 1 52. The method as recited in claim 50, wherein said circuit is located within signal
2 conditioning electronics separate from said package.
- 1 53. The method as recited in claim 42, wherein said additional electronics provides
2 excitation or synchronous demodulation.
- 1 54. The method as recited in claim 42, wherein said additional electronics converts an ac
2 waveform from said bridge to a dc voltage.
- 1 55. The method as recited in claim 34, further comprising the step of packaging said coil
2 in a hermetic package.
- 1 56. The method as recited in claim 34, wherein said step of opening a plurality of
2 windows comprises abrading said insulation, chemically etching said insulation, or
3 laser ablating said insulation.

- 1 57. The method as recited in claim 56, wherein in said step of laser ablating said
2 insulation, an excimer laser is used.
- 1 58. The method as recited in claim 56, wherein in said step of laser ablating said
2 insulation, each said window in said wire insulation extends over a plurality of wires
3 of said winding.
- 1 59. The method as recited in claim 56, wherein said step of laser ablating said insulation
2 comprises ablating a ring shaped window in said wire insulation.
- 1 60. The method as recited in claim 34, wherein said insulation comprises polyimide.
- 1 61. The method as recited in claim 34, further comprising the step of providing a movable
2 core within said tube for adjusting inductance of said coil.
- 1 62. The method as recited in claim 61, further comprising the step of providing a
2 structure for holding position of core within tube.
- 1 63. The method as recited in claim 62, further comprising the step of providing a
2 structure for resetting position of core within tube.
- 1 64. The method as recited in claim 63, wherein said structure for resetting position of
2 core within tube comprises an electronically controllable clamp.
- 1 65. The method as recited in claim 64, wherein said electronically controllable clamp
2 comprises a shape memory alloy.

1 66. The method as recited in claim 63, wherein said structure for resetting position of
2 core further comprises a spring so said core can snap to a new position when said
3 clamp is released.

1024-035

1 67. A discrete winding, comprising:
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3 a conductor wound in a coil on a tube, said coil comprising a coil outer surface,
4 said coil outer surface comprising insulation, a window in said insulation
5 exposing said conductor of said coil for a contact to said conductor; and
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7 a movable core within said tube for adjusting inductance of said coil.

1024-035

1 68. A clamp comprising an elastic material, a shape memory alloy, and an apparatus for
2 activating said shape memory alloy, wherein when said alloy is activated it changes
3 shape and provides a force on said elastic material to change clamping state.

1 69. A clamp as recited in claim 68, further comprising a power supply, wherein said
2 shape memory alloy is activated by current from said power supply.

1 70. A clamp as recited in claim 68, further comprising a spring for restoring a workpiece
2 held by said clamp when said clamping state is changed to open said clamp.

1 71. A clamp as recited in claim 70, wherein said clamp is for holding peak displacement
2 of a core of a variable reluctance transducer.

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